Qualitative Comparative Analysis: An Innovative Approach for Unravelling Causal Complexity in Education Research

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Aims for today

- To give you a very brief introduction to QCA and its potential for examining an illustrative case

- When it is useful and what it can do

- Its assumptions and requirements

- How it is compares with standard qualitative and quantitative techniques

- I will not address in much detail how to do conduct it

Social and educational phenomena are complex

- Most social and educational phenomena are complex

- There is rarely one reason or solution for a problem

- The relevance of particular reasons/factors are often conditioned by other reasons/factors

- Common to think about cases – countries, schools, companies, organisations – and the reasons that explain their "performance" on a given outcome or social phenomenon

An example of a problem...

- School social segregation varies substantially across countries but we don't really know why

- Previous research has identified policies and structures that are associated with segregation

- No single factor is likely to explain much for most cases; correlations of individual variables are small or nil

- We know the factors but we don't know much about how they combine and are moderated by each other and by unique national contexts

- Because we don't have good theory, we can't give good policy recommendations and solutions

Some examples of our limited theory

- How can we explain cross-national differences in school social segregation?

- Private schooling - Australia and Netherlands are both high

- Income inequality – US? Canada? Australia?

- School choice – is it always segregating, or only (mostly) under certain conditions?

	Privatization	School choice	Income inequality	School selectivity	School segregation
Aus	High	High	Moderate	Low	High
Neth.	High	High	Moderate	High	Low
Canada	Low	Moderate	Moderate	Low	Low
UK	Low	Moderate	Moderate	Moderate	Low
US	Low	Low	High	Low	High
Czech	Low	High	Low	High	Moderate

What I am trying to figure out…

- Why do some countries have more socially integrated school systems than others?

- What are the "causal pathways" that are associated with school social integration (and with segregation) cross-nationally?

- When are particular policies/structures segregating or integrating, and when are they not? What conditions are necessary for them to be integrating?

- To develop a theory of school segregation that accounts for complex interactions and multiple configurations (causal complexity)

Difficulties with standard quant approaches

- Standard quantitative approaches are great for understanding relationships between variables but are limited for variations between cases (e.g., countries)

  - Putting all cases together (regression blender) can obscure variation in the importance of variables across cases

  - Running individual regressions for each country can't explain variations between countries

  - Regressions provide limited information about interactions between variables

- Standard quant also not able to handle small samples, e.g. 20 countries. Usually focuses instead on students as the unit of analysis.

Difficulties with standard qualitative, historical-comparative analysis

- Could compile data for all relevant variables identified in the literature, and then look for patterns to explain cross-national variations – standard qualitative, historical-comparative analysis

- In-depth analyses are hard to do systematically for more than a handful of countries, though.

- Useful for explaining cross-national variations in a subset of theoretically relevant countries but not for identifying a broader range of possible causal pathways.

- Identifying variables among high-performing countries isn't enough; can be (and often are) shared by low-performing countries as well.

What is needed…

An approach that can:

- Treat cases (e.g., countries) holistically

- Handle medium n samples (10-100)

- Analyse systematically

- Handle multiple causal (explanatory) pathways/recipes

- Handle pathways that are configurations of variables

- Identify any necessary and/or sufficient conditions that explain the outcome

- Handle asymmetry – what causes an outcome does not necessarily mean that the absence of the variable does not cause the outcome

Solution: Qualitative Comparative Analysis (QCA)

- Developed by Charles Ragin in late 1980s, American comparative sociologist; now based at UC Irvine

- Designed for comparing complex cases that are comprised of multiple variables. Ideal for cross-national comparisons and case-based research

- Originally designed for small-medium samples; increasingly being used for larger samples

- Used primarily in political science and sociology, but also in organization/management studies and health (comparing companies and organizations)

- European researchers are at the forefront

- Not used much in education but has huge potential for comparing schools and systems.

QCA in education

- Approx 20 articles have been published using QCA to examine educational phenomena (out of approx. 600 listed on the Compass website).

- None of the education studies have used QCA to examine cross-national differences.

- Mostly done by sociologists (of education)

- Educational research journals that have published this work:

  AERJ, Brit J Sociology of Ed, Cambridge J of Ed, Int 'l J of Res & Method in Ed, Research in Science Education, Teaching and Teacher Ed, Computers & Education, J of School Choice, Research Papers in Education, Higher Education, Comparative Education, J of Educational Change

- *From http://www.compasss.org/bibliography/educat.htm*

QCA: approach

- Draws on qual and quant approaches (but more qual)

    - respects the diversity and complexity of cases and their contexts (ideographic) while also identifying generalizable cross-case patterns (nomothethetic)

- Systematic approach for identifying patterns across cases

- Case-based, not variable-based

- Based on set-theoretics, not correlations

- Uses Boolean logic: "a formalism for describing logical relations in the same way that ordinary algebra describes numeric relations". Doesn't use statistical probability.

Comparisons with correlation-based quantitative research

- Both QCA and standard quant regression approaches examine the variables (conditions) that explain (predict) the outcome.

- Regression: Which variables predict the outcome? What is the unique contribution of each variable? What is the strength of the association between each IV and DV?

- QCA: What are the multiple pathways that explain the outcome? Which combinations of variables explain the outcome? Are some variables necessary and/or sufficient? Do some variables only explain the outcome in combination with other variables? Which pathways explain the absence of the outcome?

Comparisons with qualitative research

- Variables are operationalised qualitatively using set theoretics.

- Numbers and scale data can be used to calibrate the variables, but numbers are not used in the analysis.

- Examples of variables: high performing and non-high performing; wealthy and non-wealthy; poor and not poor.

- The "dividing line" between the sets needs to be clear. Rarely can determine in one go, is usually an iterative process.

QCA assumptions

- More than one causal path to the outcome (equifinality)

- Paths are often comprised of multiple conditions (conjuncture)

- Influence of a condition depends on its configuration with other conditions

- Causal pathways are often asymmetrical

- QCA is ideal if you want to examine:

    - Equifinality, conjuncture, asymmetry

QCA requirements

- Knowledge about the cases

- Knowledge about the conditions (variables); 7 conditions is max

- Variation in the outcome variable

- Theoretical foundation – at least some knowledge to guide the analysis; grounded theory won't work

- Hunches about causal pathways

QCA and theory building

- Inductive and iterative approach, interplay between modelling and data throughout analytical process. Very different than quant approaches.

- Useful for generating theory. Again, like qual.

- Should be followed up with in-depth case studies. Not meant to stand alone or to be the last or only word.

- Can also be used to build theoretical/conceptual typologies.

QCA: analytical process

- Select conditions based on theory and knowledge of the cases.

- Calibrate conditions into binary or nominal categories (crisp or fuzzy sets). Use theory and knowledge of the cases to guide the calibration. Common to adjust throughout the analytical process. Procedures exist for converting scale/interval data. Logic of set membership.

- Number of possible combinations = 2^k (k=# of conditions); more than 7 is unwieldy.

- Generate a "truth table"; each row is a possible combination and count number of cases for each combination.

- Logically minimize terms to create "solution formula" or propositions, typically 3 solutions (complex, intermediate and parsimonious). Express in Boolean algebraic terms.

- Interpret results in terms of sufficient and necessary conditions.

- Free software is available but still need to do much of the analysis manually.

Final thoughts about QCA

- QCA has much potential but needs to be done with care. Sloppy, badly done analyses abound.

- As a new-ish method, software is not sophisticated.

- Still often necessary to explain its foundations when publishing – can get tedious.

- Learning it requires an investment of time and effort. Training courses are available (see Compass website for info).

- Like any approach, QCA can answer some kinds of questions but not all. Standard quant and qual techniques are still necessary!